REMARKS

Claims are pending in the Application as shown above. For the reasons set out below, it is submitted that the pending claims meet the objections raised by the Examiner with respect to the originally filed Application and that consequently the Application is in condition for allowance.

Claim Objection Met in Pending Claims

Regarding the objection raised by the Examiner in paragraph 3.1 of the Action, it is respectfully submitted that the claims set out above do follow a logical grouping and numbering scheme. Dependent claims in the pending claims up to claim 28 are grouped together with the claims to which they refer. The dependent claims 28-29, 31-38 each relate to a computer program product for carrying out a method as defined in the set of pending claims 1, 8, 10-13 and 24-27. This grouping of computer program product claims is logically arranged. It is therefore submitted that the claims as grouped and numbered above do follow a logical and understandable pattern, as amended.

Pending Claims Meet 35 U.S.C. § 112, Second Paragraph

Regarding the claim rejection set out by the Examiner in paragraph 4.2 of the Action, amended claim 1 has been provided to make clear the distinct steps of the claim. Amended claim 1 defines a series of steps, commencing with the generation of a transitive effect machine data structure for each component in the selected set of components. It is known in the art that different implementations will permit the generation of such transitive effect machine data structures for effects of interest and for given set of components in a data structure model in a compositional state system. It is submitted that specific implementations used to carry out the method of step (a) in amended claim 1 will be apparent to those skilled in the art and the recitation of such specific implementation details are not required for compliance with 35 U.S.C. 112, second paragraph.

Further, amended claim 1 sets out steps relating to carrying out a reduction process on the generated transitive effect machine data structures. It is submitted that various computer-implemented reduction processes for state machine data structure models are known in the art and no specific such reduction process need be recited in step (b) of amended claim 1. The Specification at paragraphs 10 and 11 refer to prior art reduction processes (in, for example, US Patent 6,192,505). Examples in the Specification refer to computer-implemented reduction by removal of redundant elements (US Patent 6,192,505) and by equivalence reductions such as observation equivalence reduction processes (See the R. Milner reference in paragraph 11 of the Specification).

As amended claim 1 reads, the method of the claim requires that there be a defined reduction process carried out on the selected transitive effect machine data structure. The reduction process may be any suitable reduction process, the claim requiring however that the reduction group states into a single class defined by common properties with respect to the events of interest.

Such a method will result in a reduced state space representation, including the representation of the data structure model with transitive effect machine data structures being generated for the components in the defined set of components. It is submitted that the essential steps for the generation of such a reduced state space representation are found in amended claim 1, as understood by one skilled in the art. The steps in the method for the generation of transitive effect machine data structures, as described in the Specification and set out in amended claim 1, and for the carrying out of reduction processes on the defined transitive effect machine data structures will be implementation-specific and are known to those skilled in the art.

As will be apparent, the use of assumed reductions for generation of a reduced state space representation is not recited in amended claim 1, such a step being recited in amended claim 8. For this reason, the reference in the Action to the Specification of page 20, lines 5-12 to the use

of assumed reductions is pertinent to amended claim 8 and its dependent claims, and not to amended claim 1. As the Specification sets out in paragraphs 68 and following, assumed reductions are described as one way of carrying out a reduction process for a defined state space representation but is not the only way contemplated in the Specification, which previously sets out the more general approach (paragraphs 56 to 64).

For the above reasons, it is submitted that the objection of paragraph 4.2 of the Action with respect to claim 1 and its dependent claims 2-7 is overcome by amended claim 1 and its pending dependent claims. Similarly, the objection to claims 24-29 and 35-39 are overcome by the amendment to claim 1.

It is submitted that the objection of paragraph 4.3 of the Action is met by amended claim 8 which includes the steps previously defined in originally filed claim 9. As is made clear by the inclusion of the steps of originally filed claim 9, amended claim 8 does not claim merely an intended outcome but rather includes a set of steps that lead to the generation of a reduced state space representation.

Regarding the objection raised by the Examiner in paragraph 4.4 of the Action, although applicant does not agree that the claims referred to are indefinite applicant cancels the claims 39-44 referred to by the Examiner.

Amended Claims 1-8, 9-27 Meet 35 U.S.C. §101

Concerning the rejection of method claims 1-27, as set out in paragraph 5.1 of the action, applicant has amended these claims to make specific that the method is a computer implemented method that acts on data structures. Such a method is tied to a technological art, environment or machine and results in a concrete, useful and tangible result. The Specification indicates how such a computer implemented method may be used, for example, for generation of test cases for computer programs modeled as state machines, as is referred to in paragraph 110. Such methods

relate to an automated process to be carried out without mental steps and are, it is submitted, of a technical nature and within statutory subject matter as defined by 35 U.S.C. 101.

The Pending Claims Are Not Anticipated in View of the Applied Art

In the Action, claims 1-7, 28 and 39-40 were rejected under 35 U.S.C. § 102(b) as being unpatentable over Lee et al., "Ordering Method for Reducing State Space in Compositional Verification," 1999 IEEE International Conference on Systems, Man and Cybernetics, Vol. 1. pp. 806-811 (referred to as the "Lee reference").

This rejection is respectfully traversed.

Amended Claims 1-7, and 28 Are Not Anticipated By The Lee Reference

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros.* v. *Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987); MPEP § 2131.

In amended claims 1-7, and 28 of the Application, reduction processes are defined to be carried out on transitive effect machine data structures to provide a reduced state space representation. The Lee reference describes reducing state space in compositional verification but does so in a manner that differs from what is claimed in amended claims 1-7 and 28. As is apparent from the elements set out in amended claims 1-7 and 28, the invention of the claims relates to methods including the generation of transitive effect machine data structures. In contrast, the Lee reference describes the use of CDEVS and does not teach the generation of transitive effect machine data structures.

The Lee reference describes CDEVS as initially corresponding to the original components of a state machine. As part of the Lee reference approach to reducing the state space, CDEVS are composed to create new CDEVS. This approach to reducing the state space, by carrying out a composition of CDEVS, differs significantly from the approach of defining

transitive effect machine data structures. As set out in the amended claims of the application, each transitive effect machine data structure corresponds to one original component. Reduction processes are specified as being carried out on each the transitive effect machines data structures. Unlike the Lee reference approach, in the Application an approach is taught and claimed in which there is no composition step (ie there is no step of composing the transitive effect machine data structures with each other).

As the above indicates, CDEVS (which are successively generated by the composition of previous CDEVS) differ from transitive effect machine data structures, as claimed, in this regard. The latter are defined (see amended claim 1) such that, for a selected component, "the states of the transitive effect machine data structure represent the states of the component." The transitive effect machine data structures are each individually subject to a reduction process. There is no composition of transitive effect machine data structures with each other. This is in contrast with the generation of CDEVS which is carried out by composition. For this reason alone, CDEVS cannot be said to "correspond" to transitive effect machine data structures as such data structures are recited in the claims of the Application. The state explosion problem results from the composition of components and the use of CDEVS, whose generation includes composition steps, will not avoid the composition of components as is the case with the use of transitive effect machine data structures as claimed in amended claims 1-7 and 28.

For the above reasons, it is therefore respectfully submitted that the 102(b) rejection set out in paragraphs 6.1 to 6.3 is not applicable to amended claims 1-7 and 28.

For the reasons set out above, favorable reconsideration and allowance of this application are respectfully requested.

Conclusion

Each of Applicant's pending claims specifically recites features and relationships that are neither disclosed nor suggested in the applied art, the pending claims are not indefinite and the claims relate to statutory subject matter. Allowance of all of Applicants' pending claims is therefore respectfully requested.

This amendment is being filed with a request for a three-month extension of time. Please charge the required fees, or any additional fees required to facilitate filing this paper, to Deposit Account No. 500388 (Order No. DSC1P003).

Respectfully submitted,
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